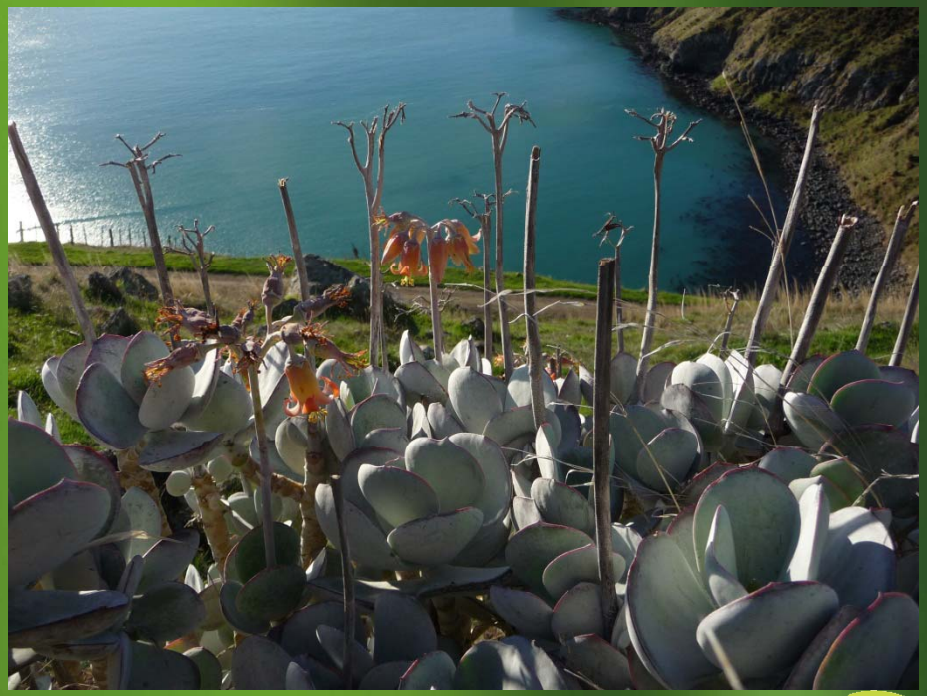
# Distribution and potential spread of alien succulents on Banks Peninsula



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*Supervisors Prof P. Hulme, Prof R. Duncan*

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***Bioprotection science for New Zealand***

# Exotic succulents invading Banks Peninsula

- 12 *Crassulaceae* sp naturalized on BP
- Native range hot, dry e.g. SA, Morocco

- Garden escapes – now widespread
- *Cotyledon orbiculata* – Pig's ear
  - S. African, likes rock or sparse veg

- Why should we care?

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# Our study investigates potential spread of Pig's ear

- Presence/absence survey - 620km²
- Survey populations
  - Plants tagged, revisited next year
  - Pop growth, performance, seed output
- Transplant experiment
  - 5 plants and germination tray, 0-800m
  - Measure performance over 2 years
- Spatial models using climate to predict
- **Aim: use models and real world data to predict potential for spread on BP**

Photo: Manuel M. Ramos
http://www.flickriver.com/photos/_mm_/tags/cotyledon/

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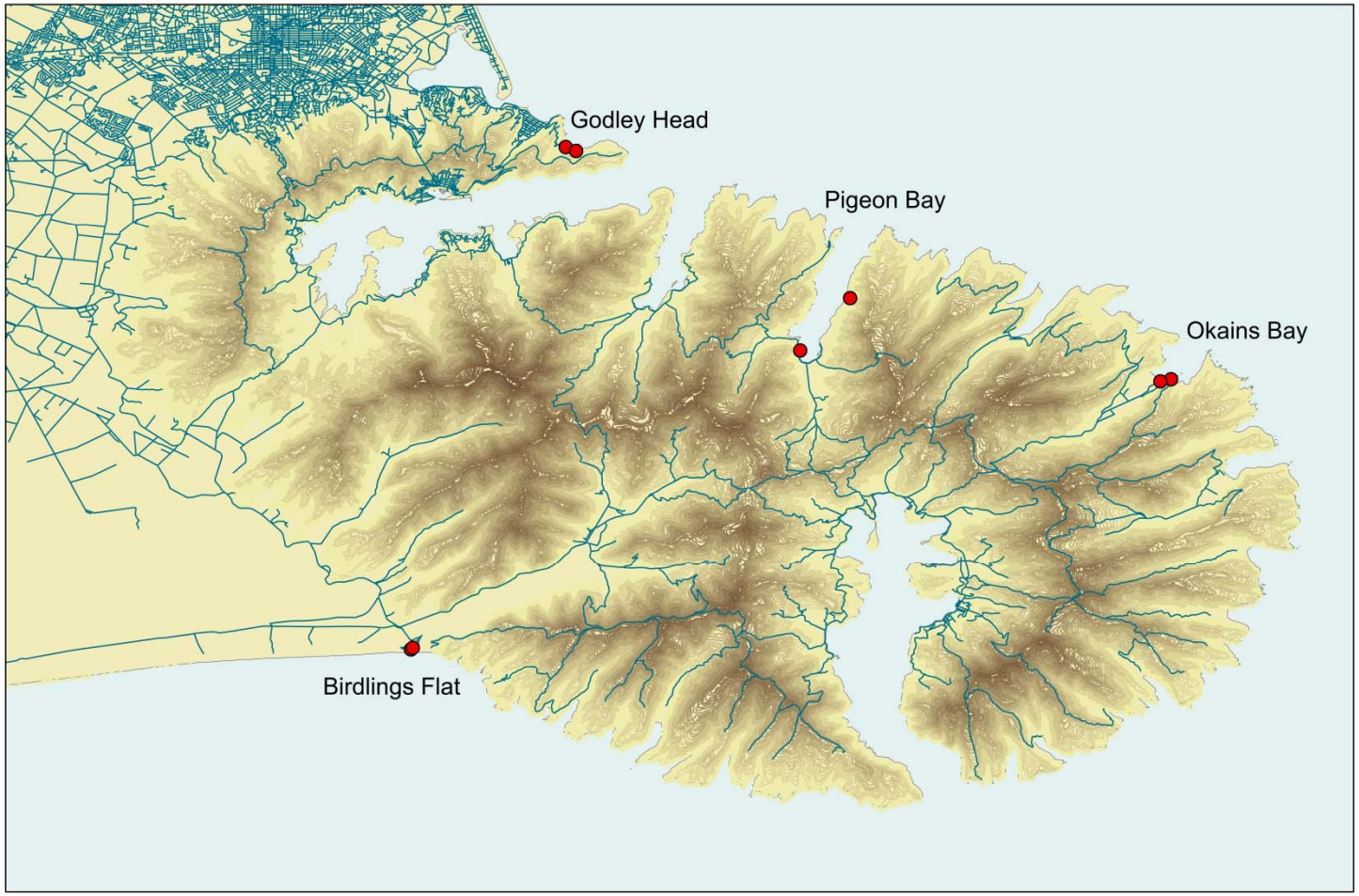
# Survey Locations

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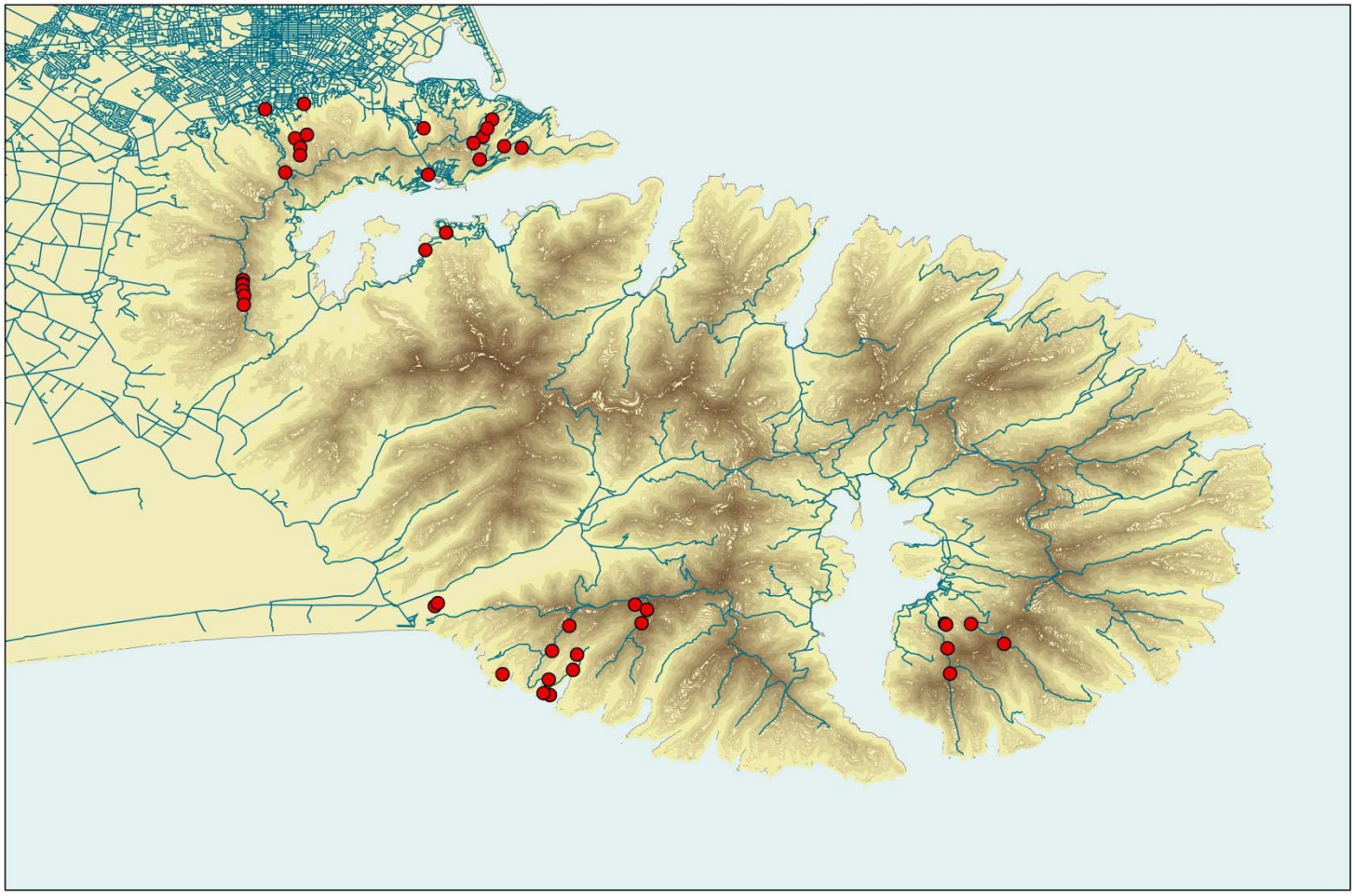
# Experiment Locations



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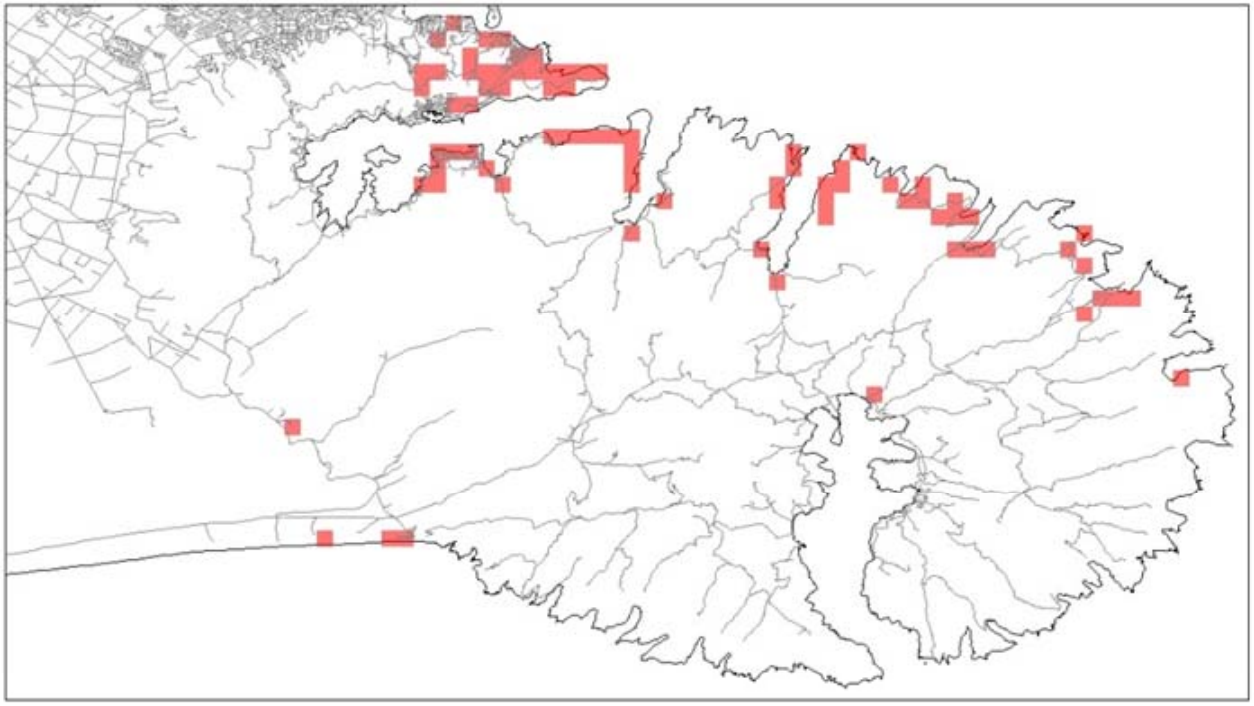
# Real world results

- P/A survey
  - Large populations in many of northern & eastern bays
  - Mostly cliffs, outcrops, loess banks, also tussock
  - Since found in Flea Bay (Di Carter, CCC)



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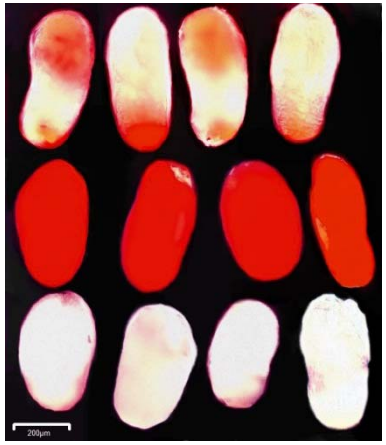
# Real world results

- Population surveys – site averages
  - Large populations ~ 1000 mature plants/250m²
  - Low death rate – 6.5% (min 0%, max 16%)
  - Lots of new seedlings – 473 per site
  - Extremely high seed output;
    - **42,500** seeds per plant
    - **89%** of seeds viable



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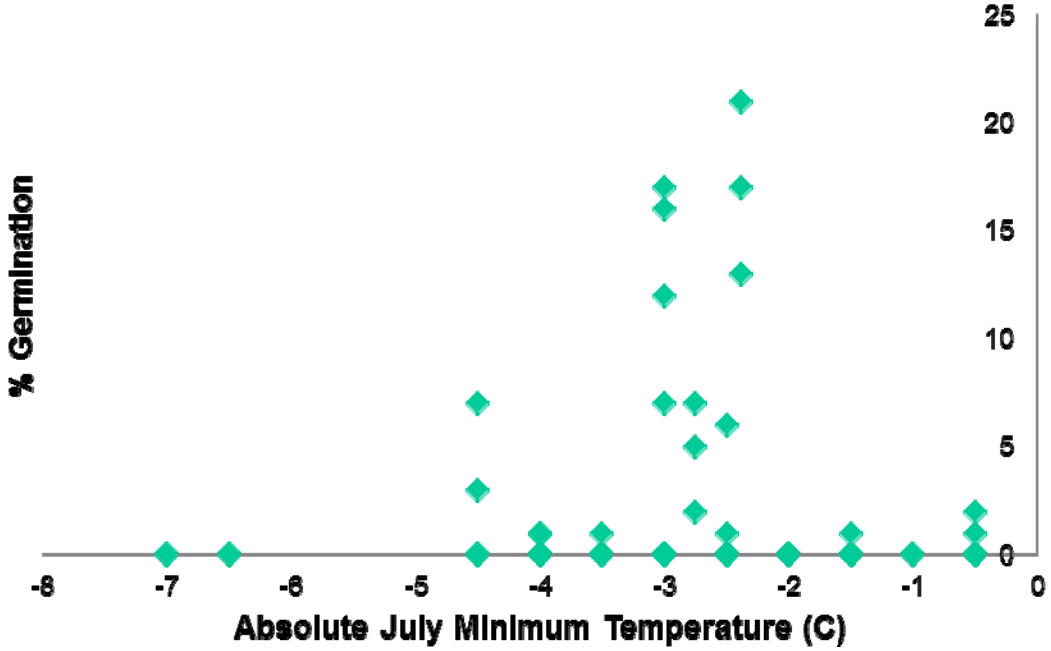
# Real world results

- Experiment
  - Rapid growth – 5 to 35 cm height 2 years
  - Hard to kill! Survive down to -7°C or lower
  - Rainfall/soil moisture is most damaging
  - Do not germinate lower than -5°C

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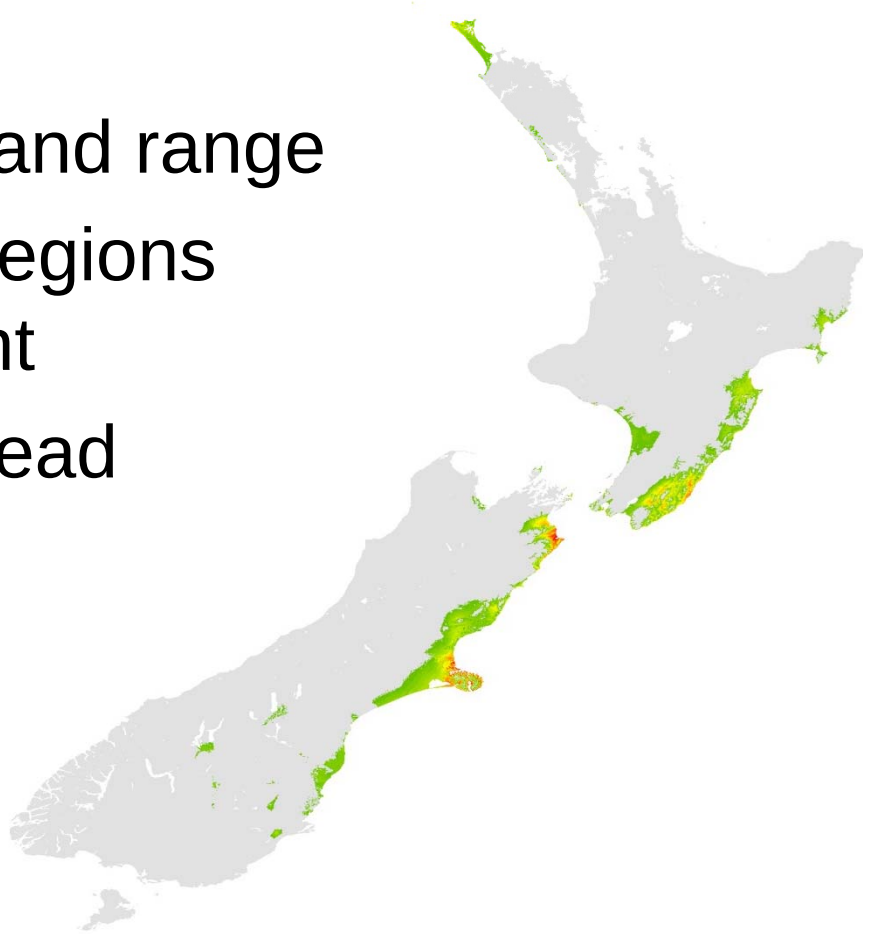
# Model results

- Native and New Zealand range
- Restricted mostly to regions where already present
- Potential for local spread
- Banks Peninsula
  - Much of peninsula climatically suitable

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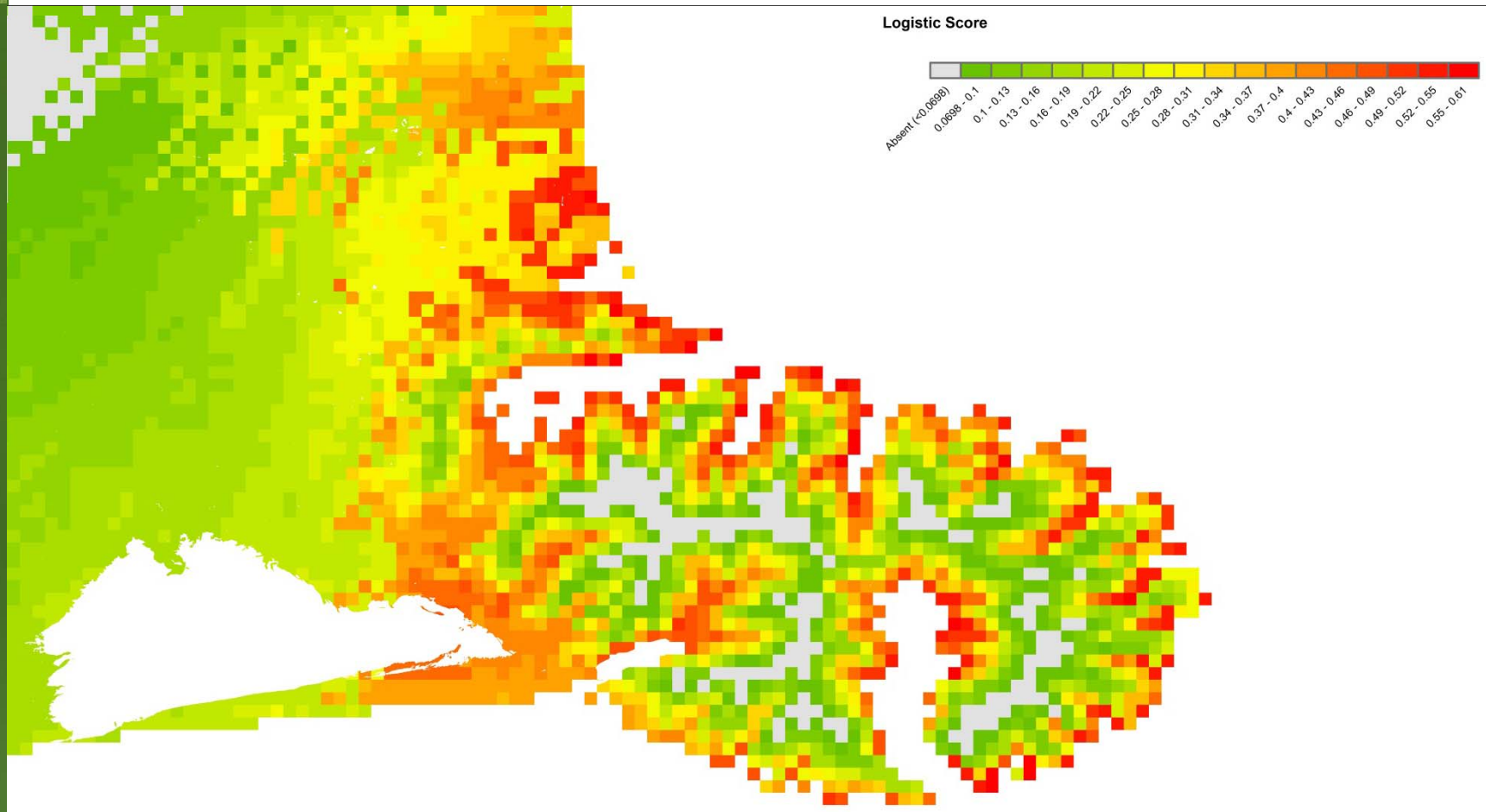
# Model for Banks Peninsula

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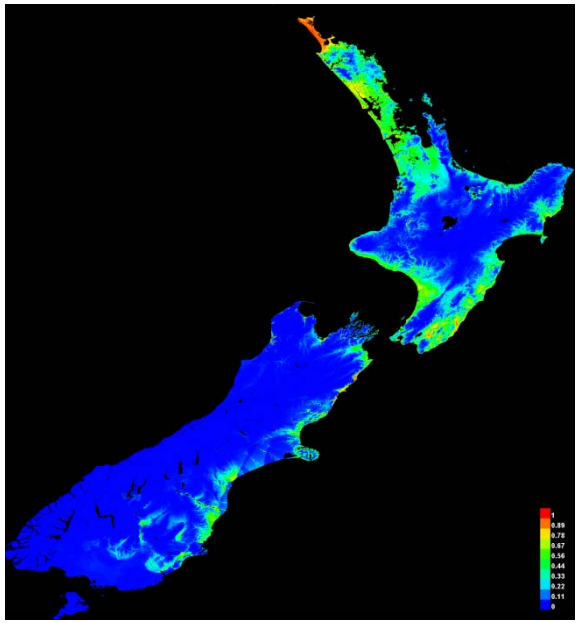
# What's next?

- Combine real world data with my model
  - Better picture of possible spread
- Make predictions for a changing climate



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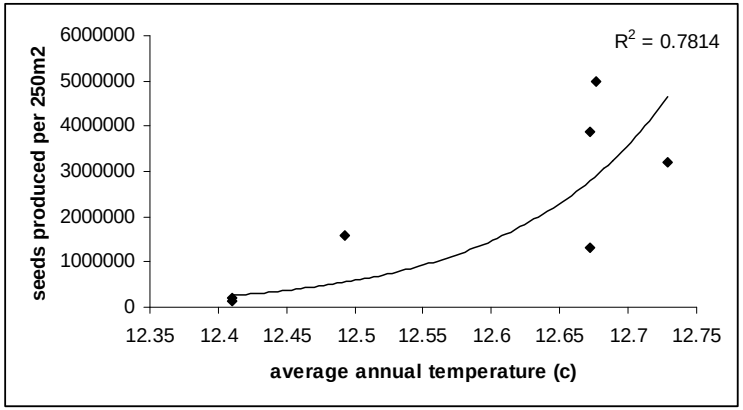


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# Main findings (so far)

- Surveys:
  - Grow & reproduce rapidly, many seeds
  - More tolerant of cold than expected
- Models:
  - All of BP coastline suitable climate
  - Only highest peaks of BP too cold/wet
- Strong potential for spread – coast, inland outcrops and dry areas
- **But**, bear in mind…
  - Only shows suitable *climate*
  - Land use & soil also important

Photo: Wikipedia

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# Thanks for listening, any questions?

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